AMENDMENT TO THE SPECIFICATION

Replacement paragraph for the paragraph beginning at page 1, line 8 and ending at page 1, line 20:

This invention relates to an addressing method and apparatus which can be used for network communication via light transmission technology, and more particularly relates to an addressing method and apparatus for quantum information, including quantum communication and a quantum computation network system.

1. Description of the Related Art

Quantum information technology is a new scientific field which started in the 1990s. There are many problems being researched, and it is not applied on a large scale, so there will not be any open technologies related to this invention. According to the experience about classical network information technology, quantum network information technology will be the kernel technology of quantum communication. Comparing with classical communication and considering the characteristics of quantum communication, a quantum network system must satisfy these basic capability requirements:

Replacement paragraph for the paragraph beginning at page 1, line 41 and ending at page 2, line 37:

5. A Nnetwork system should keep quantum coherence (except receiving and measurement), that means any decoherence process should be as weak as possible, and the system should not have any photoelectric or electrooptic conversion process except for receiving and measurement.

6. There should not be any amplification of the quantum signal inside the network system. This is the basic requirement of quantum no-cloning theorem.

Up to now, there are no quantum network framework theory and technology that accord with all the requirements above. The research on quantum key distribution over a network has made the biggest progress in this field; existing main technologies come down to:

1. tree topology network

This network has two working modes. One mode is, sending modulated single photons to multiple receivers randomly by fibered beam splitters, and then making quantum key distribution between sender and receivers. This mode needs a control center, all users have to share information with control center, that would be unendurable in secure communication sometimes, and besides, communication efficiency is in inverse ratio to the number of terminals in the network and descends when communication distance increases, that limits the extensibility of the network. The other mode uses wavelength addressing, that is, control center uses wavelength as address of receiver, makes quantum key distribution with any user. This mode solves the problem that communication efficiency ~~descends~~decreases because of the beam splitters, but the security problem, sharing information with a control center, still exists. Another important problem is, users besides the control center can not

communicate directly with each other, so a tree topology network is not a network proper.

2. ring topology network

This network links all users one by one to make one or more closed rings, any two users in the ring make secure communication by certain protocol with the help of control center and do not share any secure information with the center. In this network, all users must be in the ring, which limits the location of the user; the average communication distance between any two users is less than half of the ultimate quantum key distribution distance, and the more users it has, the smaller distance there will be between the adjacent users. This network has already ~~got~~has three modes, first one link with each user in series; an improved one uses a "space optical switch" to link many small rings to a big ring, every user can be on/off the big ring by using the "space optical switch", this can achieve variable area quantum network, but in any case, there is only one pair of users can work at the same time; the third one use wavelength addressing, theoretically users can communicate with each other directly without center and work at the same time, but the limitation of the communication distance still exists, the number of wavelength must satisfy N=n*(n-1)/2, here N is the number of wavelength, n is the number of users, this limits the number of users in the network.

Replacement paragraph for the paragraph beginning at page 3, line 5 and ending at page 3, line 7:

It is an object of the present invention to provide an addressing method of a quantum network and a quantum network router. With this router, we can construct an equi-weighted multi-user quantum network system.

Replacement paragraph for the paragraph beginning at page 4, line 42 and ending at page 5, line 17:

Quantum communication with this invention has many advantages as follows:

1. Take the router as exchanging and routing center of quantum network, the structure of network is independent from users, so the quantum network is similar to classical network, the system composition and operation can be separated and manage canonically.
2. The number of nodes in the router can increase. The total number of wavelength that the router uses is less than the number of nodes, the utilization efficiency of wave band is high, theoretically the wave band can be divided into any shares and utilize repeatedly, the amount of nodes can increase unlimitedly. According to current technology, the amount of nodes can be more than 150, is 3 times bigger than other method.
3. Nodes communicate with different wavelength, channels are separated from each other, isolation of channels only depends on isolation of wavelength division multiplexer, there is little crosstalk and no contention of resource between channels, communication efficiency is impervious to the amount of nodes.
4. The ~~R~~router of this invention has a low insertion loss, less than 2dB for each channel.
5. Using this invention one can realize quanta communication, ~~in deed,~~ includesing

quanta cryptographic key distribution, quanta network transmission, namely generalized quanta communication, composing quanta computer addressing bus or quantum computer network, etc.

6. Because the quantum network comes from a classical network appending some limitation, this quantum network router can be an optical router in classical communication, realize static routing function in classical communication network.

Replacement paragraph for the paragraph beginning at page 5, line 41 and ending at page 6, line 7:

1. A quantum network router which is made up of commercial wavelength division multiplexers

A ~~Q~~quantum network router can be made up of commercial wavelength division multiplexers according to the principle of the invention. FIG. 1 shows a typically block diagram of internal structure of 4 nodes quantum network router. As shown in FIG.1, inside dashed is the internal structure of router, 1-1~1-4 are the same commercial wavelength division multiplexers, λ1, λ2, λ3 are different wavelengths (in fact it is wave band of certain width) which should satisfy the requirement of insertion loss and isolation; 2-1~2-6 are connections between separate wavelength interfaces which have the same wavelength, they can be optical paths comprising single mode fiber, separate component or wave-guide; 3-1~3-4 are mix-wavelength interfaces, and can be connected with users by arterial fiber.

Replacement paragraph for the paragraph beginning at page 6, line 44 and ending at page 7, line 4:

When a quantum network router is finished, every node has a form of IP address, the user connect with this node can find the address of other users according to the form and communicate with them. FIG.5 and FIG.6 show the forms of IP address for three nodes and four nodes quantum network router. For a router with more than four nodes, there is also a form of IP address, form for odd nodes router is similar to FIG.5, form for even nodes router is similar to FIG.6.